



data communications

Installation and Operation Manual

# ***AMC-101***

***Universal Media  
Converter/Repeater***



# AMC-101

## Universal Media Converter/Repeater Installation and Operation Manual

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# Limited Warranty

RAD warrants to DISTRIBUTOR that the hardware in the AMC-101 to be delivered hereunder shall be free of defects in material and workmanship under normal use and service for a period of twelve (12) months following the date of shipment to DISTRIBUTOR.

If, during the warranty period, any component part of the equipment becomes defective by reason of material or workmanship, and DISTRIBUTOR immediately notifies RAD of such defect, RAD shall have the option to choose the appropriate corrective action: a) supply a replacement part, or b) request return of equipment to its plant for repair, or c) perform necessary repair at the equipment's location. In the event that RAD requests the return of equipment, each party shall pay one-way shipping costs.

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This Agreement shall be construed and governed in accordance with the laws of the State of Israel.

# General Safety Instructions

The following instructions serve as a general guide for the safe installation and operation of telecommunications products. Additional instructions, if applicable, are included inside the manual.

## Safety Symbols



**Warning**

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**This symbol may appear on the equipment or in the text. It indicates potential safety hazards regarding product operation or maintenance to operator or service personnel.**

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**Danger of electric shock! Avoid any contact with the marked surface while the product is energized or connected to outdoor telecommunication lines.**

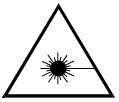
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Protective earth: the marked lug or terminal should be connected to the building protective earth bus.

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**Warning**

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**Some products may be equipped with a laser diode. In such cases, a label with the laser class and other warnings as applicable will be attached near the optical transmitter. The laser warning symbol may be also attached.**

**Please observe the following precautions:**

- **Before turning on the equipment, make sure that the fiber optic cable is intact and is connected to the transmitter.**
- **Do not attempt to adjust the laser drive current.**
- **Do not use broken or unterminated fiber-optic cables/connectors or look straight at the laser beam.**
- **The use of optical devices with the equipment will increase eye hazard.**
- **Use of controls, adjustments or performing procedures other than those specified herein, may result in hazardous radiation exposure.**

**ATTENTION: The laser beam may be invisible!**

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In some cases, the users may insert their own SFP laser transceivers into the product. Users are alerted that RAD cannot be held responsible for any damage that may result if non-compliant transceivers are used. In particular, users are warned to use only agency approved products that comply with the local laser safety regulations for Class 1 laser products.

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this product. No installation, adjustment, maintenance or repairs should be performed by either the operator or the user.

# Handling Energized Products

## General Safety Practices

Do not touch or tamper with the power supply when the power cord is connected. Line voltages may be present inside certain products even when the power switch (if installed) is in the OFF position or a fuse is blown. For DC-powered products, although the voltages levels are usually not hazardous, energy hazards may still exist.

Before working on equipment connected to power lines or telecommunication lines, remove jewelry or any other metallic object that may come into contact with energized parts.

Unless otherwise specified, all products are intended to be grounded during normal use. Grounding is provided by connecting the mains plug to a wall socket with a protective earth terminal. If an earth lug is provided on the product, it should be connected to the protective earth at all times, by a wire with a diameter of 18 AWG or wider. Rack-mounted equipment should be mounted only in earthed racks and cabinets.

Always make the ground connection first and disconnect it last. Do not connect telecommunication cables to ungrounded equipment. Make sure that all other cables are disconnected before disconnecting the ground.

## Connection of AC Mains

Make sure that the electrical installation complies with local codes.

Always connect the AC plug to a wall socket with a protective ground.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Always connect the power cord first to the equipment and then to the wall socket. If a power switch is provided in the equipment, set it to the OFF position. If the power cord cannot be readily disconnected in case of emergency, make sure that a readily accessible circuit breaker or emergency switch is installed in the building installation.

In cases when the power distribution system is IT type, the switch must disconnect both poles simultaneously.

## Connection of DC Mains

Unless otherwise specified in the manual, the DC input to the equipment is floating in reference to the ground. Any single pole can be externally grounded.

Due to the high current capability of DC mains systems, care should be taken when connecting the DC supply to avoid short-circuits and fire hazards.

DC units should be installed in a restricted access area, i.e. an area where access is authorized only to qualified service and maintenance personnel.

Make sure that the DC supply is electrically isolated from any AC source and that the installation complies with the local codes.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Before connecting the DC supply wires, ensure that power is removed from the DC circuit. Locate the circuit breaker of the panel board that services the equipment and switch it to the OFF position. When connecting the DC supply wires, first connect the ground wire to the corresponding terminal, then the positive pole and last the negative pole. Switch the circuit breaker back to the ON position.

A readily accessible disconnect device that is suitably rated and approved should be incorporated in the building installation.

If the DC mains are floating, the switch must disconnect both poles simultaneously.

## Connection of Data and Telecommunications Cables

Data and telecommunication interfaces are classified according to their safety status.

The following table lists the status of several standard interfaces. If the status of a given port differs from the standard one, a notice will be given in the manual.

Ports	Safety Status	
V.11, V.28, V.35, V.36, RS-530, X.21, 10 BaseT, 100 BaseT, Unbalanced E1, E2, E3, STM, DS-2, DS-3, S-Interface ISDN, Analog voice E&M	SELV	Safety Extra Low Voltage:  Ports which do not present a safety hazard. Usually up to 30 VAC or 60 VDC.
xDSL (without feeding voltage), Balanced E1, T1, Sub E1/T1	TNV-1	Telecommunication Network Voltage-1:  Ports whose normal operating voltage is within the limits of SELV, on which overvoltages from telecommunications networks are possible.
FXS (Foreign Exchange Subscriber)	TNV-2	Telecommunication Network Voltage-2:  Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are not possible. These ports are not permitted to be directly connected to external telephone and data lines.
FXO (Foreign Exchange Office), xDSL (with feeding voltage), U-Interface ISDN	TNV-3	Telecommunication Network Voltage-3:  Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are possible.

**Always connect a given port to a port of the same safety status. If in doubt, seek the assistance of a qualified safety engineer.**

Always make sure that the equipment is grounded before connecting telecommunication cables. Do not disconnect the ground connection before disconnecting all telecommunications cables.

Some SELV and non-SELV circuits use the same connectors. Use caution when connecting cables. Extra caution should be exercised during thunderstorms.

When using shielded or coaxial cables, verify that there is a good ground connection at both ends. The earthing and bonding of the ground connections should comply with the local codes.

The telecommunication wiring in the building may be damaged or present a fire hazard in case of contact between exposed external wires and the AC power lines. In order to reduce the risk, there are restrictions on the diameter of wires in the telecom cables, between the equipment and the mating connectors.

**Caution**

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To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cords.

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**Attention**

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Pour réduire les risques d'incendie, utiliser seulement des conducteurs de télécommunications 26 AWG ou de section supérieure.

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Some ports are suitable for connection to intra-building or non-exposed wiring or cabling only. In such cases, a notice will be given in the installation instructions.

Do not attempt to tamper with any carrier-provided equipment or connection hardware.

## Electromagnetic Compatibility (EMC)

The equipment is designed and approved to comply with the electromagnetic regulations of major regulatory bodies. The following instructions may enhance the performance of the equipment and will provide better protection against excessive emission and better immunity against disturbances.

A good earth connection is essential. When installing the equipment in a rack, make sure to remove all traces of paint from the mounting points. Use suitable lock-washers and torque. If an external grounding lug is provided, connect it to the earth bus using braided wire as short as possible.

The equipment is designed to comply with EMC requirements when connecting it with unshielded twisted pair (UTP) cables. However, the use of shielded wires is always recommended, especially for high-rate data. In some cases, when unshielded wires are used, ferrite cores should be installed on certain cables. In such cases, special instructions are provided in the manual.

Disconnect all wires which are not in permanent use, such as cables used for one-time configuration.

The compliance of the equipment with the regulations for conducted emission on the data lines is dependent on the cable quality. The emission is tested for UTP with 80 dB longitudinal conversion loss (LCL).

Unless otherwise specified or described in the manual, TNV-1 and TNV-3 ports provide secondary protection against surges on the data lines. Primary protectors should be provided in the building installation.

The equipment is designed to provide adequate protection against electro-static discharge (ESD). However, it is good working practice to use caution when connecting cables terminated with plastic connectors (without a grounded metal hood, such as flat cables) to sensitive data lines. Before connecting such cables, discharge yourself by touching earth ground or wear an ESD preventive wrist strap.

## FCC-15 User Information

This equipment has been tested and found to comply with the limits of the Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the Installation and Operation manual, may cause harmful interference to the radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



## Canadian Emission Requirements

This Class A digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulation.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

### Warning per EN 55022 (CISPR-22)

***Warning***

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This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user will be required to take adequate measures.

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***Avertissement***

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Cet appareil est un appareil de Classe A. Dans un environnement résidentiel, cet appareil peut provoquer des brouillages radioélectriques. Dans ces cas, il peut être demandé à l'utilisateur de prendre les mesures appropriées.

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***Achtung***

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Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

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# Declaration of Conformity

**Manufacturer's Name:** RAD Data Communications Ltd.

**Manufacturer's Address:** 24 Raoul Wallenberg St.  
Tel Aviv 69719  
Israel

declares that the product:

**Product Name:** AMC-101

conforms to the following standard(s) or other normative document(s):

**EMC:** EN 55022:1998 + A1:2000, A2:2003 Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement.

EN 55024:1998 + A1:2001, A2:2003 Information technology equipment – Immunity characteristics – Limits and methods of measurement.

**Safety:** EN 60950-1:2001 Information technology equipment – Safety – Part 1: General requirements.

## Supplementary Information:

The product herewith complies with the requirements of the EMC Directive 89/336/EEC, the Low Voltage Directive 73/23/EEC and the R&TTE Directive 99/5/EC for wired equipment. The product was tested in a typical configuration.

Tel Aviv, 5 March 2006



Haim Karshen  
VP Quality

**European Contact:** RAD Data Communications GmbH, Otto-Hahn-Str. 28-30, 85521 Ottobrunn-Riemerling, Germany

# Quick Start Guide

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Installation of AMC-101 should be carried out only by an experienced technician. If you are familiar with AMC-101, use this quick start guide to set it up for operation.

Perform the installation procedures for both the local and the remote units.

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## 1. Installing AMC-101

Instructions given below detail the settings that you have to make in order to configure AMC-101 for proper operation. The table, which comes after the configuration instructions, lists the AMC-101 internal jumpers and their possible settings.

### Configuring AMC-101

► **To configure AMC-101:**

1. Disconnect all the cables connected to AMC-101.
1. Unscrew the two rear panel screws holding the top panel.
2. Slide out the top panel to gain access to the interior of the unit.
3. Set the JP2 and JP7 jumpers (see table below).
4. Reinstall the top cover.

Jumper	Description	Settings (Default settings in bold)
JP2	If illegal combination of card types and selected data rate is detected, CONFIG alarm is relayed and FLT LED blinks	<b>Jumper installed</b>
	If illegal combination of card types and selected data rate is detected, CONFIG alarm is masked and FLT LED remains OFF	Jumper not installed
JP7	If no signal is received from the other side, idle signal is transmitted	Jumper installed
	If no signal is received from the other side, idle signal is not transmitted	<b>Jumper not installed</b>

## Installing Interface Modules

The AMC-101 interface modules are hot-swappable, that means they can be replaced when the unit is ON.

➤ **To install an interface module:**

1. Slide the module into appropriate slot.
2. Fasten the two front panel screws to secure the module to the AMC-101 frame.

## Connecting the Cables

➤ **To connect the fiber optic cables:**

1. Remove the protective caps from the connectors and store them in a safe place for later use.
2. Connect the transmit fiber to the connector marked TX and the receive fiber to the connector marked RX.
3. At the remote unit connect the transmit fiber to RX and the receive fiber to TX.

➤ **To connect AC power to AMC-101:**

1. Connect the power cable to the power connector on the AMC-101 rear panel.
2. Connect the power cable to the mains outlet.

The unit will be turned on automatically upon connection to the mains.

➤ **To connect DC power to AMC-101:**

- Refer to DC power supply connection supplement.

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## 2. Operating AMC-101

AMC-101 requires no operator attention once installed, with the exception of occasional monitoring of front panel indicators. Refer to table below for the correct status of the AMC-101 indicators after the local and remote units are synchronized and data is being transferred.

Indicator	Status
PWR	ON
FLT (AMC-101)	OFF
WRAP	OFF
SIG	ON

# Contents

## Chapter 1. Introduction

1.1 Overview.....	1-1
Applications.....	1-1
Features.....	1-1
1.2 Physical Description.....	1-5
1.3 Functional Description.....	1-6
1.4 Technical Specifications.....	1-7

## Chapter 2. Installation and Setup

2.1 Site Requirements and Prerequisites .....	2-1
2.2 Package Contents .....	2-1
2.3 Installing AMC-101 .....	2-2
Configuring AMC-101 .....	2-2
Installing Interface Modules.....	2-3
Connecting the Interfaces .....	2-4
Connecting the Power .....	2-4

## Chapter 3. Operation

3.1 Front Panel Controls and Indicators .....	3-1
3.2 Operating AMC-101 .....	3-2
Turning On AMC-101 .....	3-2
Normal Indications .....	3-2
Turning Off AMC-101 .....	3-2

## Chapter 4. Alarms and Diagnostics

4.1 Alarm Relay .....	4-1
4.2 Diagnostic Loopbacks .....	4-2

## Appendix A. Interface Modules



# Chapter 1

## Introduction

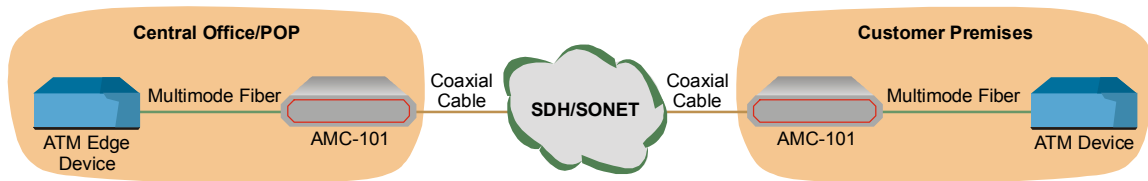
### 1.1 Overview

AMC-101 is a universal modular media converter that provides retimed or transparent conversion of optical and electrical signals for ATM, SDH/SONET, FDDI, Fast Ethernet and other protocols at data rates of up to 155 Mbps.

The AMC-101 modules are also available as cards for LRS-101 broadband rack, holding up to 14 cards.

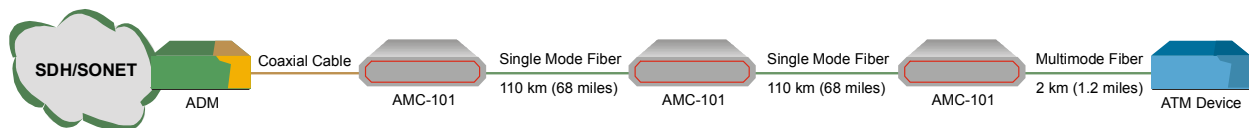
### Applications

*Figure 1-1* illustrates AMC-101 in an ATM extension application.



*Figure 1-1. AMC-101 Extending ATM Services over an SDH/SONET Network*

*Figure 1-2* shows AMC-101 operating as a media converter and repeater.



*Figure 1-2. AMC-101 Operating as Media Converter and Repeater*

### Features

AMC-101 is a modular media converter and repeater, operating over fiber optic, UTP, STP and coax lines.

#### Retimed Media Conversion

AMC-101 supports retimed media converting/repeating for:

- 51 Mbps OC-1
- 100 Mbps TAXI
- 155 Mbps OC-3/STM-1
- 155 Mbps STS-3c over UTP/STP cables
- 155 Mbps STS-3c/STM-1 over coax cables

- FDDI
- Fast Ethernet.

Retimed modules provide clock regeneration and data reshaping.

### Transparent Media Conversion

AMC-101 supports transparent conversion of fiber optic signals up to 155 Mbps for:

- ATM/SDH/SONET
- Ethernet
- Token Ring.

Transparent modules provide low-cost conversion for applications that do not require repeating or reclocking. In addition, AMC-101 provides Ethernet bridging over fiber optic links.

### AMC-101 Modules

AMC-101 supports hot-swappable, electrical and fiber optic modules, including long haul and WDM interfaces. [Table 1-1](#) and [Table 1-2](#) list all fiber optic and electrical modules supported by AMC-101. [Appendix A](#) provides schematics of the modules and their technical specifications.



Table 1-1. Fiber Optic Interface Modules

Module Name	Transmitter Type, Wavelength [nm]	Connector Type	Fiber Type	Typical Optical Power [dBm]	Receiver Sensitivity [dBm]	Typical Range According to Data Rates					
						51 Mbps		100 Mbps		155 Mbps	
						[km]	[miles]	[km]	[miles]	[km]	[miles]
AMC-M/MM/ST/85 (transparent only)	VCSEL, 850	SC, ST, FC	62.5/125, multimode	-17	-30	3	1.8	2	1.2	2	1.2
AMC-M/MM/SC/85 (transparent only)											
AMC-M/MM/FC/85 (transparent only)											
AMC-M/MM/SC/13	LED, 1310	SC, ST	62.5/125, multimode	-18	-31	4	2.4	2	1.2	2	1.2
AMC-M/MM/ST/13											
AMC-M/SM/SC/13L	Laser, 1310	SC, ST, FC	9/125, single mode	-12	-31	40	25	25	15.5	20	12.4
AMC-M/SM/ST/13L											
AMC-M/SM/FC/13L											
AMC-M/SM/SC/13LH	Laser (long haul), 1310	SC, ST, FC	9/125, single mode	-2	-34	60	37	50	31	40	25
AMC-M/SM/ST/13LH											
AMC-M/SM/FC/13LH											
AMC-M/SM/ST/15L	Laser, 1550	ST, FC	9/125, single mode	-12	-31	50	31	25	15.5	20	12.4
AMC-M/SM/FC/15L											
AMC-M/SM/SC/15LH	Laser (long haul), 1550	SC, ST, FC	9/125, single mode	-2	-34	110	68	100	62.1	80	49.7
AMC-M/SM/ST/15LH											
AMC-M/SM/FC/15LH											
AMC-M/SF1/SC	Laser (WDM), Tx – 1310 Rx – 1550	SC	9/125, single mode	-12	-29	35	21.7	25	15.5	20	12.4
AMC-M/SF2/SC	Laser (WDM), Tx – 1550 Rx – 1310	SC	9/125, single mode	-12	-29	35	21.7	25	15.5	20	12.4
AMC-M/SF3	Laser (single fiber), 1310 Tx and Rx	SC/APC	9/125, single mode	-12	-27	20	12.4	20	12.4	20	12.4

**Note**

- Typical ranges are calculated according to attenuation of 0.4 dB/km for 1310 nm and 0.25 dB/km for 1550 nm modules.
- The Fast Ethernet and FDDI protocols are supported by the retimed modules only.
- All modules support TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1 protocols.

Table 1-2. Electrical Interface Modules

Module Name	Retimed/ Transparent	Protocols Supported	Cable Type	Connector Type	Impedance	Typical Range (Attenuation)			
						Retimed Mode		Transparent Mode	
						[m]	[ft]	[m]	[ft]
AMC-M/UTP/155	R/T	STS-3c	UTP Cat 5	Shielded RJ-45	100	100	328	50	164
AMC-M/STP/155	R/T	STS-3c	STP Type 1	DB-9	150	100	328	50	164
AMC-M/UTP/100	R/T	FDDI	UTP Cat 5	Shielded RJ-45	100	100	328	50	164
AMC-M/10BT/B*	R	Ethernet	UTP Cat 5	Shielded RJ-45	100	100	328	–	–
AMC-M/CX/BNC/155	R	STS-3c, STM-1	Coax	BNC	75	12.7 dB**			
AMC-M/CX/DIN/155	R	STS-3c, STM-1	Coax	DIN 47295 1.6/5.6 coax	75	12.7 dB**			

- Notes**
- The AMC-M/10BT/B modules require the modules of the same type installed at the local and remote sites of the application (AMC-101 only).
  - 135m range of the AMC-M/CX/BNC/155 and AMC-M/CX/DIN/155 is attainable when using RG-59 B/U (at 78 MHz, in accordance with the square root of frequency law).

### Controls

AMC-101 includes a rate selector for retimed modules (51, 100, 155 Mbps). For transparent modules, the rate selector is set to the OTHER position.

**Note** If the rate selector is set to OTHER, retimed modules operate in transparent mode.

### Diagnostics

AMC-101 supports activation of simultaneous loopbacks towards the user and network sides. The loopbacks are activated via a front panel WRAP pushbutton.

### Alarm Relay

AMC-101 includes a D-type 9-pin dry contact female connector, which serves for relaying major and minor alarms.

### Compliance

AMC-101 operation complies with ATM Forum and ITU-T G.957 and G.958 specifications.

## 1.2 Physical Description

AMC-101 is a modular standalone unit intended for the desktop or 19-inch rack installation. [Figure 1-3](#) illustrates a 3D view of a typical AMC-101 unit.



*Figure 1-3. AMC-101, 3D View*

The front panel of the unit includes interface modules, LEDs, rate selector and loopback activation pushbutton. For a detailed description of the front panel, see [Chapter 3](#).

The rear panel includes a power connector (AC or DC) and alarm relay port. The AMC-101 rear panel is described in greater detail in [Chapter 2](#).

### 1.3 Functional Description

Figure 1-4 illustrates the AMC-101 circuit blocks in the form of the functional block diagram.

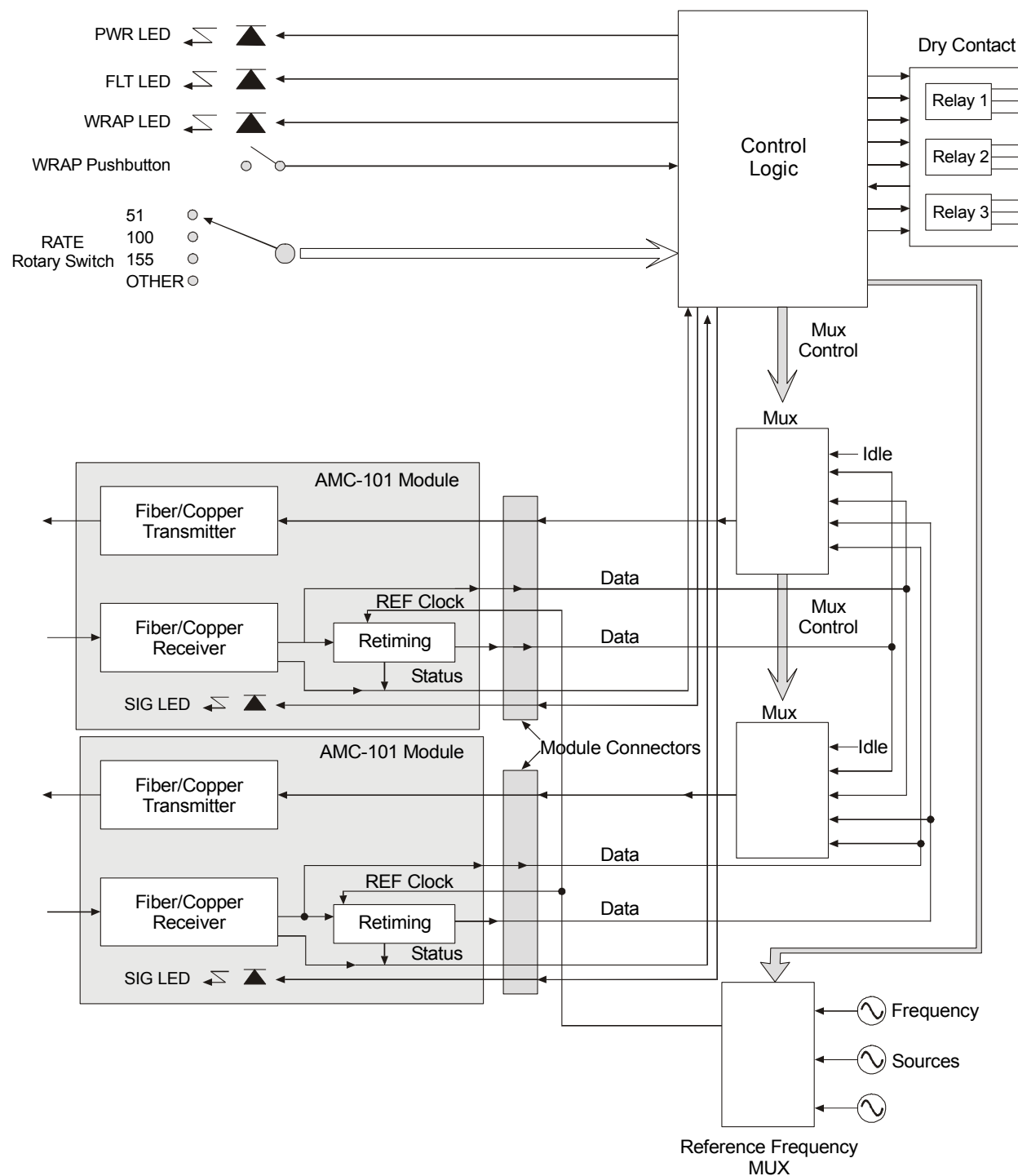


Figure 1-4. AMC-101 Block Diagram

## 1.4 Technical Specifications

<b>Modules</b>	<i>Types and Specifications</i>	Refer to <a href="#">Table 1-1</a> , <a href="#">Table 1-2</a> and <a href="#">Appendix A</a>
	<i>Data Rate</i>	Up to 155 Mbps
	<i>Compliance</i>	ATM Forum, ITU-T G.957, G.958
<b>Controls</b>	<i>WRAP</i>	Activates a loopback towards the user and network sides
	<i>RATE</i>	Selects the operation rate (51, 100, 155 Mbps) for retimed modules or transparent mode (OTHER)
<b>Indicators</b>	<i>PWR (green)</i>	Power
	<i>FLT (red)</i>	Mismatch between card type and selected data rate
	<i>WRAP (green)</i>	A loopback is active
	<i>SIG (green)</i>	A valid signal is present
<b>Alarm Relay</b>	<i>Connector</i>	Dry contacts, D-type, 9-pin female
	<i>Supported Alarms</i>	Yellow, red and CONFIG
<b>Physical</b>	<i>Height</i>	4.4 cm (1.7 in 1U)
	<i>Width</i>	21.6 cm (8.5 in)
	<i>Depth</i>	24.2 cm (9.5 in)
	<i>Weight</i>	1.1 kg (2.4 lb)
<b>Power</b>	<i>AC Source</i>	100–240 VAC, 0.8–0.4A, 50 or 60 Hz
	<i>DC Source</i>	-48 VDC, 16W
<b>Environment</b>	<i>Temperature</i>	0°–50°C / 32°–122°F
	<i>Humidity</i>	Up to 90%, non-condensing



# Chapter 2

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## Installation and Setup

This chapter describes installation and setup procedures for the AMC-101 unit.

AMC-101 is delivered completely assembled. It is designed for tabletop or 19-inch rack installation. For instructions on installation of a single unit or two units in a 19-inch rack, refer to the rack mounting kit for 19-inch racks guide that comes with the RM kit.

After installing the unit, refer to [Chapter 3](#) to assure normal operation.

In case a problem encountered, refer to [Chapter 4](#) for test and diagnostic instructions.



**Warning**

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**Internal settings, adjustment, maintenance, and repairs may be performed only by a skilled technician who is aware of the hazards involved.**

**Always observe standard safety precautions during installation, operation, and maintenance of this product.**

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### 2.1 Site Requirements and Prerequisites

An AC-powered AMC-101 should be installed within 1.5m (5 ft) of an easily accessible grounded AC outlet. The outlet should furnish 100–230 VAC current.

A DC-powered AMC-101 unit requires -48 VDC power source, which must be adequately isolated from the mains supply. In order to prevent a fire hazard, a suitable fuse should be installed in the DC line.

Allow at least 90 cm (36 in) of frontal clearance for operating and maintenance accessibility. Allow at least 10 cm (4 in) clearance at the rear of the unit for signal lines and interface cables.

The ambient operating temperature of AMC-101 is 0 to 50°C (32 to 122°F) at relative humidity of 90%, non-condensing.

---

### 2.2 Package Contents

The AMC-101 package includes the following items:

- One AMC-101 unit
- Interface card(s)
- Technical documentation CD
- AC power cord or DC power supply connector kit
- RM-101 rack mount kit (if ordered).

---

## 2.3 Installing AMC-101

AMC-101 is a standalone device intended for tabletop or bench installation. It is delivered completely assembled. No provision is made for bolting the unit on the tabletop.

► **To install AMC-101:**

1. Determine the required configuration of AMC-101 and set the internal jumpers and switches accordingly (see [Configuring AMC-101](#) below).
2. Install interface modules (see [Installing Interface Modules](#) below).
3. Connect the interfaces (see [Connecting the Interfaces](#) below).
4. Connect power to the unit (see [Connecting the Power](#) below).



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**Access to the inside of the equipment is permitted only to the authorized and qualified personnel.**

**To avoid accidental electric shock, always disconnect the interface cables and the power cord before removing the unit from its casing.**

**Line voltages are present inside AMC-101 when it is connected to power and/or the lines. Moreover, under certain fault conditions, dangerous voltages may appear on the lines connected to the unit.**

**Any adjustment, maintenance and repair of the opened instrument under voltage must be avoided as much as possible and, when inevitable, should be carried out only by a skilled technician who is aware of the hazard involved. Capacitors inside the unit may still be charged even after the unit has been disconnected from its source of power.**

---

**Caution** AMC-101 contains components sensitive to electrostatic discharge (ESD). To prevent ESD damage, avoid touching the internal components. Before moving jumpers, touch the AMC-101 rear panel.

---

## Configuring AMC-101

This section describes how to set two jumpers located on the AMC-101 printed-circuit board. [Figure 2-1](#) illustrates the layout of the AMC-101 PCB. [Table 2-1](#) provides details on the functions of the internal jumpers and their default settings.

► **To set the internal jumpers:**

5. Disconnect all the cables connected to AMC-101.
6. Unscrew the two rear panel screws holding the top panel.
7. Slide out the top panel to gain access to the interior of the unit.
8. Set the JP2 and JP7 jumpers (see [Figure 2-1](#) and [Table 2-1](#)).
9. Reinstall the top cover.

**Caution** The AMC-101 PCB contains additional jumpers and switches that are factory-set and must not be moved by the user.

---



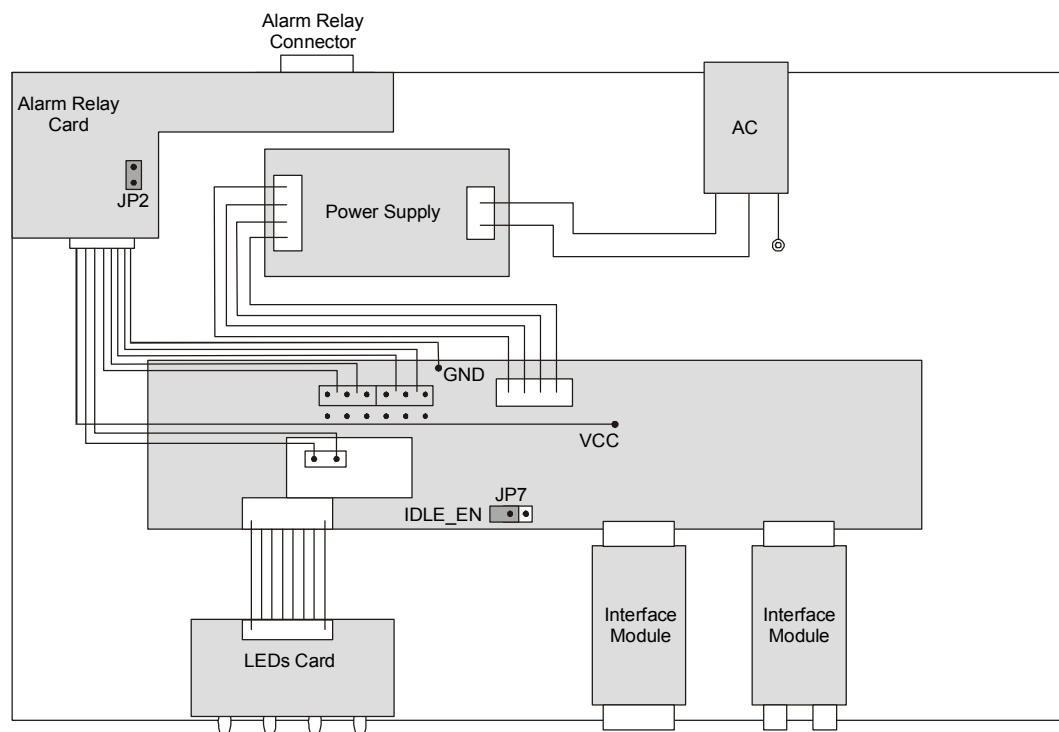


Figure 2-1. PCB Layout

Table 2-1. Jumper Settings

Jumper	Description	Settings (Default settings in bold)
JP2	If illegal combination of card types and selected data rate is detected, CONFIG alarm is relayed and FLT LED blinks	<b>Jumper installed</b>
	If illegal combination of card types and selected data rate is detected, CONFIG alarm is masked and FLT LED remains OFF	Jumper not installed
JP7	If no signal is received from the other side, idle signal is transmitted	Jumper installed
	If no signal is received from the other side, idle signal is not transmitted	<b>Jumper not installed</b>

## Installing Interface Modules

AMC-101 interface modules are hot-swappable, that means they can be replaced when the unit is ON.

### ► To install an interface module:

1. Slide the module into appropriate slot.
2. Fasten the two front panel screws to secure the module to the AMC-101 frame.

## Connecting the Interfaces

Figure 2-2 illustrates the AC-powered AMC-101 unit rear panel.

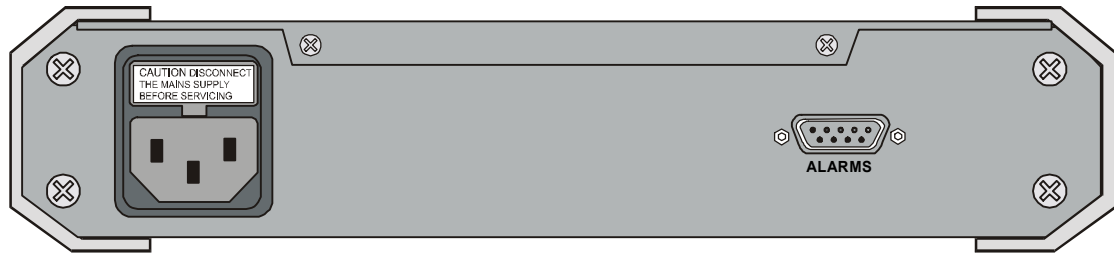


Figure 2-2. AMC-101 Rear Panel (AC Version)

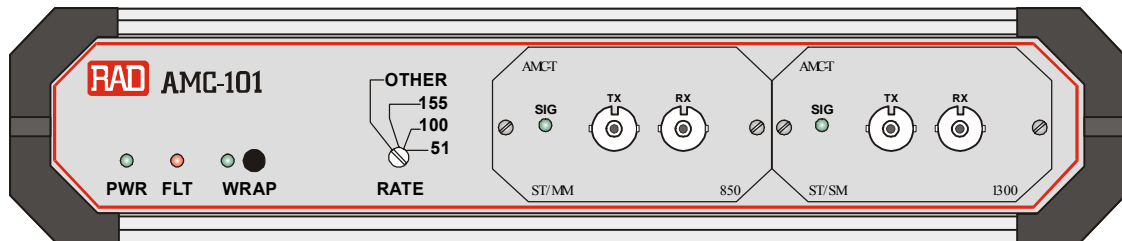


Figure 2-3. AMC-101 Front Panel

➤ **To connect the fiber optic cables:**

1. Remove the protective caps from the connectors and store them in a safe place for later use.
2. Connect the transmit fiber to the connector marked TX and the receive fiber to the connector marked RX.
3. At the remote unit connect the transmit fiber to RX and the receive fiber to TX.

➤ **To connect the alarm relay:**

- Connect external alarm device to the rear panel DB-9 connector designated ALARMS. Refer to [Chapter 4](#) for the connector pinout and alarm functions.

## Connecting the Power

To connect AMC-101 to the power source, refer to the appropriate section below, depending on your version of the unit (AC or DC).



**Warning**

**Before switching on this unit and connecting any other cable, the protective earth terminals of this unit must be connected to the protective ground conductor of the mains power cord. If you are using an extension cord (power cable) make sure it is grounded as well.**

**Any interruption of the protective (grounding) conductor (inside or outside the instrument) or disconnecting of the protective earth terminal can make this unit dangerous. Intentional interruption is prohibited.**

**The line fuse is located in an integral-type fuse holder located on the rear panel. Make sure that only fuses of the required rating, as marked on the rear panel, are used for replacement. Do not use repaired fuses or short-circuit the fuse holder. Always disconnect the mains cable before removing or replacing the fuse. Whenever it is likely that the fuse protection has been damaged, make the unit inoperative and secure it against unintended operation.**

### **AC Power Connection**

AC power should be supplied to AMC-101 through the 1.5m (5 ft) standard power cable terminated by a standard 3-prong plug. The cable is provided with the unit.

➤ **To connect AC power:**

1. Connect the power cable to the power connector on the AMC-101 rear panel.
2. Connect the power cable to the mains outlet.

The unit turns on automatically upon connection to the mains.

### **DC Power Connection**

➤ **To connect DC power:**

- Refer to DC power supply connection supplement.



# Chapter 3

## Operation

This chapter provides the following information for the AMC-101 unit:

- AMC-101 front-panel indicators and controls
- Operating procedures (turn-on, front-panel indications, performance monitoring and turn-off).

Installation procedures given in [Chapter 2](#) must be completed and checked before attempting to operate AMC-101.

### 3.1 Front Panel Controls and Indicators

[Figure 3-1](#) shows the AMC-101 front panel. [Table 3-1](#) lists the AMC-101 controls and indicators.

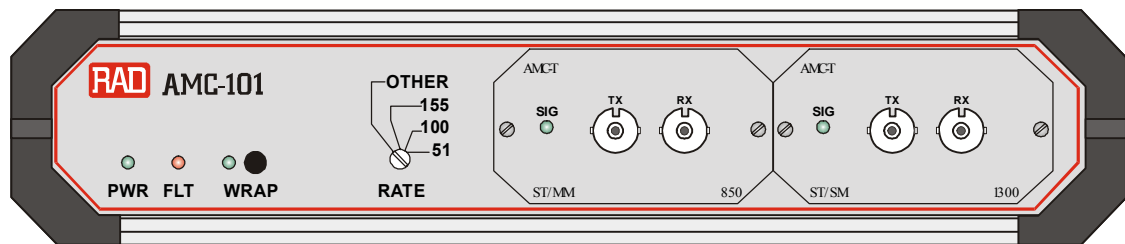


Figure 3-1. AMC-101 Front Panel

Table 3-1. AMC-101 Front Panel Controls and Indicators

Name	Type	Function
PWR	Green LED	ON – Power is ON
FLT	Red LED	Blinks – Illegal combination of card types and selected data rate is detected
WRAP	Green LED	ON – A loopback is running towards the user and network sides
SIG	Green LED	ON – A valid signal is received OFF – No signal is detected Blinks – Internal PLL is unlocked (retimed modules only)
WRAP	Pushbutton	Activates simultaneous loopbacks toward user and network sides
RATE	Rotary switch	Selects the operation rate (51, 100, 155 Mbps) for retimed modules or transparent mode (OTHER)

**Note:** If the rate selector is set to *OTHER*, retimed modules operate in transparent mode.

---

## 3.2 Operating AMC-101

### Turning On AMC-101

AMC-101 is turned on as soon as power is connected. When power is connected, the PWR indicator lights up and remains lit as long as AMC-101 receives power.

AMC-101 requires no operator attention once installed, with the exception of occasional monitoring of front panel indicators. Intervention is only required when the unit must be configured to new operational requirements, or the diagnostic tests must be performed.

### Normal Indications

[Table 3-2](#) shows the correct status of the AMC-101 indicators after the local and remote units are synchronized and data is being transferred.

*Table 3-2. AMC-101 Indicator Status*

Indicator	Status
PWR	ON
FLT	OFF
WRAP	OFF
SIG	ON

### Turning Off AMC-101

To turn off the unit, remove the power cord from the power source.

# Chapter 4

## Alarms and Diagnostics

### 4.1 Alarm Relay

The rear panel of AMC-101 units includes a D-type 9-pin female connector designated ALARMS. [Figure 4-1](#) illustrates the pinout of the AMC-101 alarm relay connector.

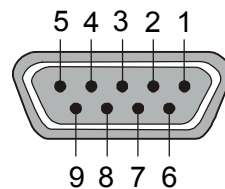


Figure 4-1. Alarm Relay Connector Pinout

The ALARMS connector is used to relay the following alarms:

- RED – Power Failure (DC voltage on board)
- YELLOW – Signal Detect Failure (to any of the unit modules)
- CONFIG – Improper Configuration (incompatible modules and/or data rates selected).

Three pins are dedicated for each alarm: Common (COM), OK and FAIL. The COM pin is the input for each alarm. The user can drive the COM pin with any signal (0 to 5V). If the signal is received OK, the COM pin is connected to its corresponding OK pin. If there is a failure, the COM pin is connected to its corresponding FAIL pin. See [Table 4-1](#) for the connector pin assignments.

For example, for the RED alarm the common input (COM) pin is 9. If there is no power failure, it connects to pin 4 (OK). If there is a failure, pin 9 connects to pin 5 (FAIL).

Table 4-1. Alarm Relay Connector Pin Assignment

Alarm	COM	OK	FAIL
RED	9	4	5
YELLOW	3	8	7
CONFIG	6	2	1

#### Note

You can prevent AMC-101 from relaying CONFIG alarm by removing the JP2 jumper plug, as explained in [Configuring AMC-101](#) in Chapter 2.

## 4.2 Diagnostic Loopbacks

Two simultaneous local loopbacks check performance of the interface modules installed in AMC-101 card, and their connections to the user equipment and to the network (see [Figure 4-2](#)).

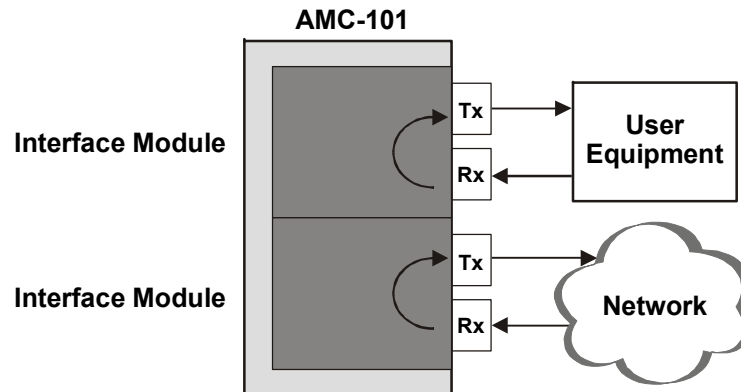


Figure 4-2. Diagnostic Loopbacks

- **To activate diagnostic loopbacks:**
  - Press the WRAP button located on the AMC-101 front panel.  
The WRAP LED turns on.
- **To deactivate local loopbacks:**
  - Press the WRAP button again.  
The WRAP LED turns off.



# Appendix A

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## Interface Modules

This appendix describes modules supported by the AMC-101 converter, providing schematics of the front panel and technical specifications.

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### A.1 Fiber Optic Modules

Typical ranges are calculated according to attenuation of 0.4 db/km for 1310 nm and 0.25 db/km for 1550 nm modules.

#### AMC-M/MM/ST/85/T

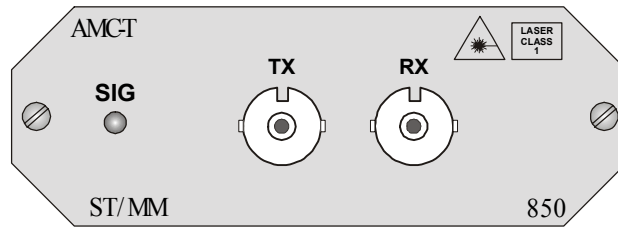
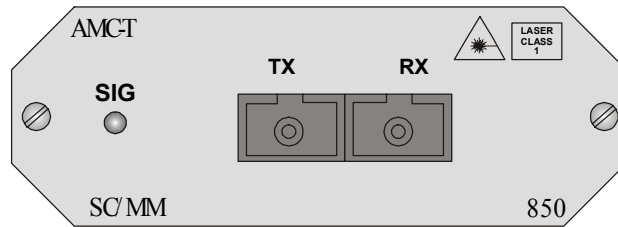


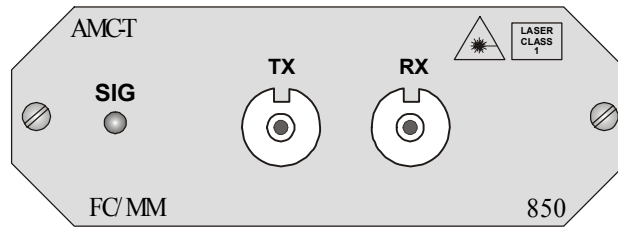
Figure A-1. AMC-M/MM/ST/85/T

#### Technical Specifications

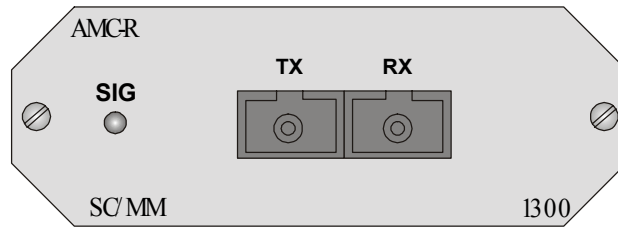
<i>Wavelength</i>	850 nm
<i>Connector</i>	ST
<i>Transmitter Type</i>	VCSEL
<i>Fiber Type</i>	62.5/125, multimode
<i>Protocols</i>	Token Ring, Ethernet
<i>Timing Mode</i>	Transparent
<i>Coding Method</i>	4B/5B, NRZ, Manchester
<i>Optical Output</i>	-18 dBm
<i>Receiver Sensitivity</i>	-30 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 3 km (1.8 miles) for 51 Mbps</li><li>• 2 km (1.2 miles) for 100 and 155 Mbps</li></ul>

**AMC-M/MM/SC/85/T***Figure A-2. AMC-M/MM/ST/85/T***Technical Specifications**

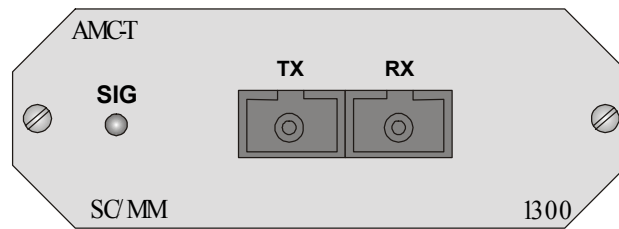
<i>Wavelength</i>	850 nm
<i>Connector</i>	SC
<i>Transmitter Type</i>	VCSEL
<i>Fiber Type</i>	62.5/125, multimode
<i>Protocols</i>	Token Ring, Ethernet
<i>Timing Mode</i>	Transparent
<i>Coding Method</i>	4B/5B, NRZ, Manchester
<i>Optical Output</i>	-18 dBm
<i>Receiver Sensitivity</i>	-30 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 3 km (1.8 miles) for 51 Mbps</li><li>• 2 km (1.2 miles) for 100 and 155 Mbps</li></ul>

**AMC-M/MM/FC/85/T***Figure A-3. AMC-M/MM/ST/85/T***Technical Specifications**

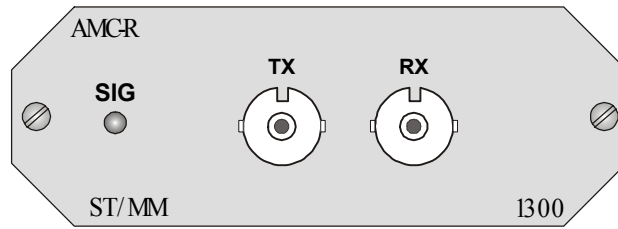
<i>Wavelength</i>	850 nm
<i>Connector</i>	SC
<i>Transmitter Type</i>	VCSEL
<i>Fiber Type</i>	62.5/125, multimode
<i>Protocols</i>	Token Ring, Ethernet
<i>Timing Mode</i>	Transparent
<i>Coding Method</i>	4B/5B, NRZ, Manchester
<i>Optical Output</i>	-18 dBm
<i>Receiver Sensitivity</i>	-30 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 3 km (1.8 miles) for 51 Mbps</li><li>• 2 km (1.2 miles) for 100 and 155 Mbps</li></ul>

**AMC-M/MM/SC/13/R***Figure A-4. AMC-M/MM/SC/13/R***Technical Specifications**

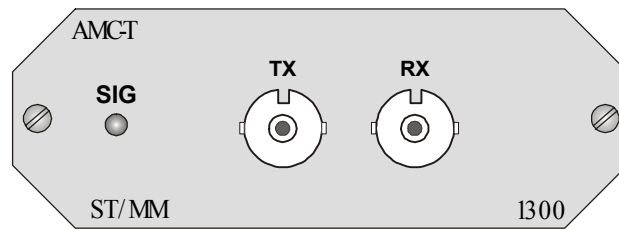
<i>Wavelength</i>	1310 nm
<i>Connector</i>	SC
<i>Transmitter Type</i>	LED
<i>Fiber Type</i>	62.5/125, multimode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-18 dBm
<i>Receiver Sensitivity</i>	-31 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 4 km (2.4 miles) for 51 Mbps</li><li>• 2 km (1.2 miles) for 100 and 155 Mbps</li></ul>

**AMC-M/MM/SC/13/T***Figure A-5. AMC-M/MM/SC/13/T***Technical Specifications**

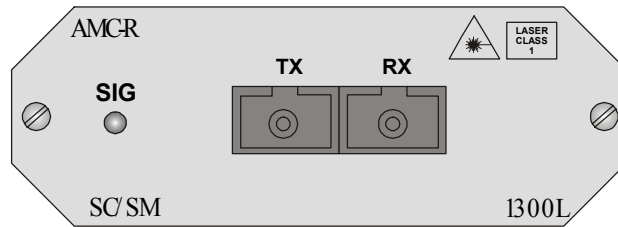
<i>Wavelength</i>	1310 nm
<i>Connector</i>	SC
<i>Transmitter Type</i>	LED
<i>Fiber Type</i>	62.5/125, multimode
<i>Protocols</i>	Any two level optical protocols up to 155 Mbps
<i>Timing Mode</i>	Transparent
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-18 dBm
<i>Receiver Sensitivity</i>	-31 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 4 km (2.4 miles) for 51 Mbps</li><li>• 2 km (1.2 miles) for 100 and 155 Mbps</li></ul>

**AMC-M/MM/ST/13/R***Figure A-6. AMC-M/MM/ST/13/R***Technical Specifications**

<i>Wavelength</i>	1310 nm
<i>Connector</i>	ST
<i>Transmitter Type</i>	LED
<i>Fiber Type</i>	62.5/125, multimode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-18 dBm
<i>Receiver Sensitivity</i>	-31 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 4 km (2.4 miles) for 51 Mbps</li><li>• 2 km (1.2 miles) for 100 and 155 Mbps</li></ul>

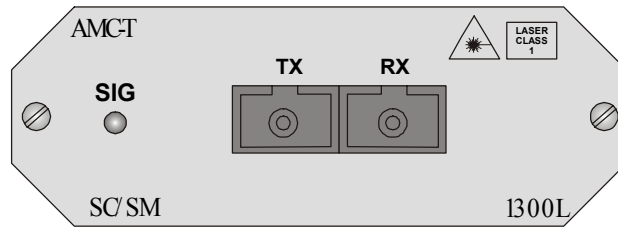
**AMC-M/MM/ST/13/T***Figure A-7. AMC-M/MM/ST/13/T***Technical Specifications**

<i>Wavelength</i>	1310 nm
<i>Connector</i>	ST
<i>Transmitter Type</i>	LED
<i>Fiber Type</i>	62.5/125, multimode
<i>Protocols</i>	Any two level optical protocols up to 155 Mbps
<i>Timing Mode</i>	Transparent
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-18 dBm
<i>Receiver Sensitivity</i>	-31 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 4 km (2.4 miles) for 51 Mbps</li><li>• 2 km (1.2 miles) for 100 and 155 Mbps</li></ul>

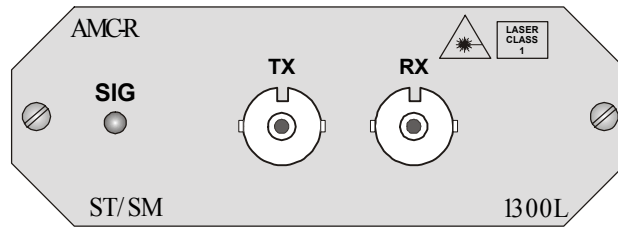
**AMC-M/SM/SC/13L/R***Figure A-8. AMC-M/SM/SC/13L/R***Technical Specifications**

<i>Wavelength</i>	1310 nm
<i>Connector</i>	SC
<i>Transmitter Type</i>	Laser
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-12 dBm
<i>Receiver Sensitivity</i>	-31 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 40 km (25 miles) for 51 Mbps</li><li>• 25 km (15.5 miles) for 100 Mbps</li><li>• 20 km (12.4 miles) for 155 Mbps</li></ul>

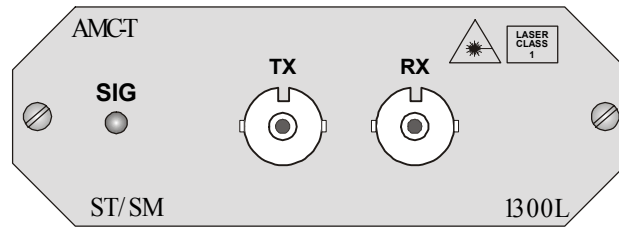


**AMC-M/SM/SC/13L/T***Figure A-9. AMC-M/SM/SC/13L/T***Technical Specifications**

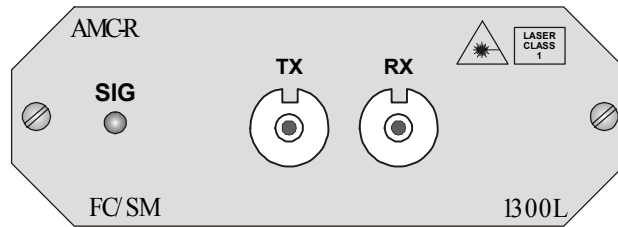
<i>Wavelength</i>	1310 nm
<i>Connector</i>	SC
<i>Transmitter Type</i>	Laser
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	Any two level optical protocols up to 155 Mbps
<i>Timing Mode</i>	Transparent
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-12 dBm
<i>Receiver Sensitivity</i>	-31 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 40 km (25 miles) for 51 Mbps</li><li>• 25 km (15.5 miles) for 100 Mbps</li><li>• 20 km (12.4 miles) for 155 Mbps</li></ul>

**AMC-M/SM/ST/13L/R***Figure A-10. AMC-M/SM/ST/13L/R***Technical Specifications**

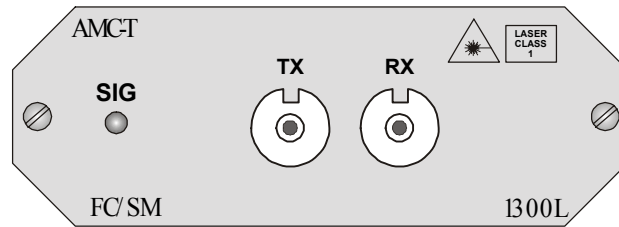
<i>Wavelength</i>	1310 nm
<i>Connector</i>	ST
<i>Transmitter Type</i>	Laser
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-12 dBm
<i>Receiver Sensitivity</i>	-31 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 40 km (25 miles) for 51 Mbps</li><li>• 25 km (15.5 miles) for 100 Mbps</li><li>• 20 km (12.4 miles) for 155 Mbps</li></ul>

**AMC-M/SM/ST/13L/T***Figure A-11. AMC-M/SM/ST/13L/T***Technical Specifications**

<i>Wavelength</i>	1310 nm
<i>Connector</i>	ST
<i>Transmitter Type</i>	Laser
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	Any two level optical protocols up to 155 Mbps
<i>Timing Mode</i>	Transparent
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-12 dBm
<i>Receiver Sensitivity</i>	-31 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 40 km (25 miles) for 51 Mbps</li><li>• 25 km (15.5 miles) for 100 Mbps</li><li>• 20 km (12.4 miles) for 155 Mbps</li></ul>

**AMC-M/SM/FC/13L/R***Figure A-12. AMC-M/SM/FC/13L/R***Technical Specifications**

<i>Wavelength</i>	1310 nm
<i>Connector</i>	FC
<i>Transmitter Type</i>	Laser
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-12 dBm
<i>Receiver Sensitivity</i>	-31 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 40 km (25 miles) for 51 Mbps</li><li>• 25 km (15.5 miles) for 100 Mbps</li><li>• 20 km (12.4 miles) for 155 Mbps</li></ul>

**AMC-M/SM/FC/13L/T***Figure A-13. AMC-M/SM/FC/13L/T***Technical Specifications**

<i>Wavelength</i>	1310 nm
<i>Connector</i>	FC
<i>Transmitter Type</i>	Laser
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	Any two level optical protocols up to 155 Mbps
<i>Timing Mode</i>	Transparent
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-12 dBm
<i>Receiver Sensitivity</i>	-31 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 40 km (25 miles) for 51 Mbps</li><li>• 25 km (15.5 miles) for 100 Mbps</li><li>• 20 km (12.4 miles) for 155 Mbps</li></ul>

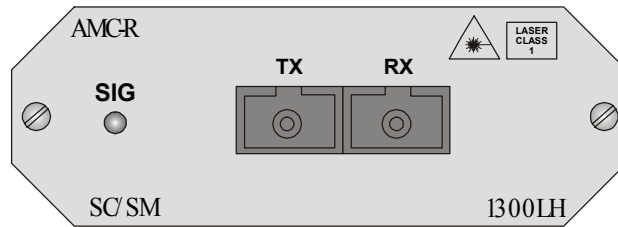
**AMC-M/SM/SC/13LH/R**

Figure A-14. AMC-M/SM/SC/13LH/R

**Technical Specifications**

<i>Wavelength</i>	1310 nm
<i>Connector</i>	SC
<i>Transmitter Type</i>	Laser, long haul
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-2 dBm
<i>Receiver Sensitivity</i>	-34 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"> <li>• 60 km (37 miles) for 51 Mbps</li> <li>• 50 km (31 miles) for 100 Mbps</li> <li>• 40 km (25 miles) for 155 Mbps</li> </ul>

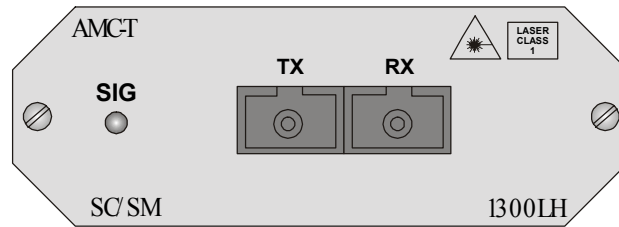
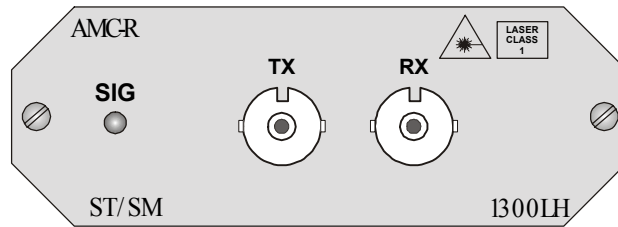
**AMC-M/SM/SC/13LH/T**

Figure A-15. AMC-M/SM/SC/13LH/T

**Technical Specifications**

<i>Wavelength</i>	1310 nm
<i>Connector</i>	SC
<i>Transmitter Type</i>	Laser, long haul
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	Any two level optical protocols up to 155 Mbps
<i>Timing Mode</i>	Transparent
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-2 dBm
<i>Receiver Sensitivity</i>	-34 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"> <li>• 60 km (37 miles) for 51 Mbps</li> <li>• 50 km (31 miles) for 100 Mbps</li> <li>• 40 km (25 miles) for 155 Mbps</li> </ul>

**AMC-M/SM/ST/13LH/R***Figure A-16. AMC-M/SM/ST/13LH/R***Technical Specifications**

<i>Wavelength</i>	1310 nm
<i>Connector</i>	ST
<i>Transmitter Type</i>	Laser, long haul
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-2 dBm
<i>Receiver Sensitivity</i>	-34 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 60 km (37 miles) for 51 Mbps</li><li>• 50 km (31 miles) for 100 Mbps</li><li>• 40 km (25 miles) for 155 Mbps</li></ul>



AMC-M/SM/ST/13LH/T

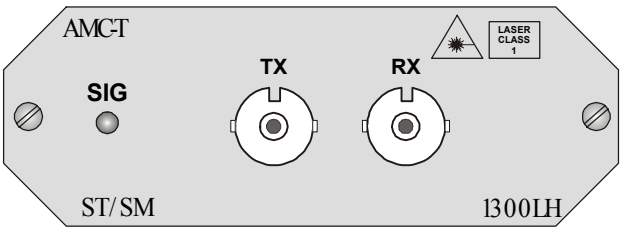


Figure A-17. AMC-M/SM/ST/13LH/T

Technical Specifications

Wavelength	1310 nm
Connector	ST
Transmitter Type	Laser, long haul
Fiber Type	9/125, single mode
Protocols	Any two level optical protocols up to 155 Mbps
Timing Mode	Transparent
Coding Method	4B/5B, NRZ
Optical Output	-2 dBm
Receiver Sensitivity	-34 dBm
Typical Range	<ul style="list-style-type: none"><li>• 60 km (37 miles) for 51 Mbps</li><li>• 50 km (31 miles) for 100 Mbps</li><li>• 40 km (25 miles) for 155 Mbps</li></ul>

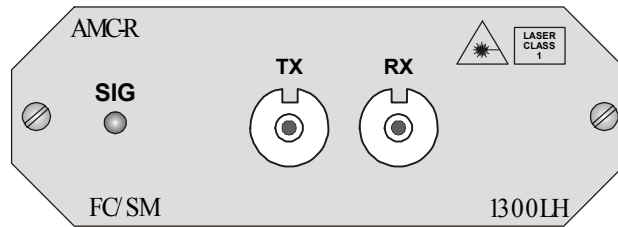
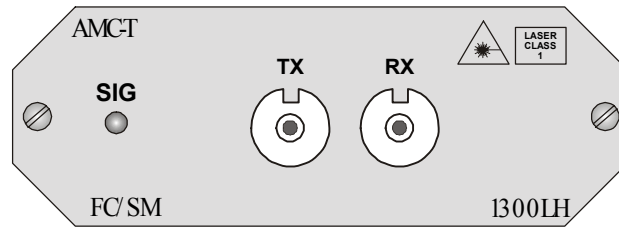
**AMC-M/SM/FC/13LH/R**

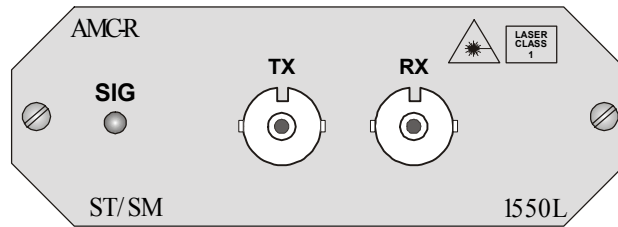
Figure A-18. AMC-M/SM/FC/13LH/R

**Technical Specifications**

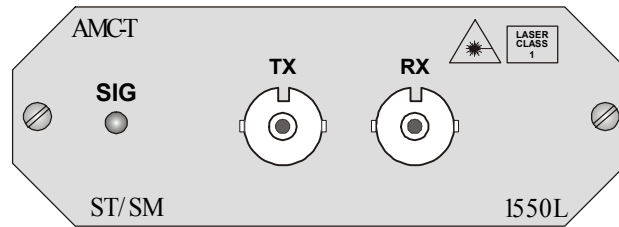
<i>Wavelength</i>	1310 nm
<i>Connector</i>	FC
<i>Transmitter Type</i>	Laser, long haul
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-2 dBm
<i>Receiver Sensitivity</i>	-34 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"> <li>• 60 km (37 miles) for 51 Mbps</li> <li>• 50 km (31 miles) for 100 Mbps</li> <li>• 40 km (25 miles) for 155 Mbps</li> </ul>

**AMC-M/SM/FC/13LH/T***Figure A-19. AMC-M/SM/FC/13LH/T***Technical Specifications**

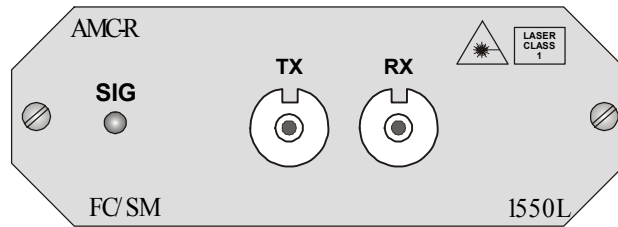
<i>Wavelength</i>	1310 nm
<i>Connector</i>	FC
<i>Transmitter Type</i>	Laser, long haul
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	Any two level optical protocols up to 155 Mbps
<i>Timing Mode</i>	Transparent
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-2 dBm
<i>Receiver Sensitivity</i>	-34 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 60 km (37 miles) for 51 Mbps</li><li>• 50 km (31 miles) for 100 Mbps</li><li>• 40 km (25 miles) for 155 Mbps</li></ul>

**AMC-M/SM/ST/15L/R***Figure A-20. AMC-M/SM/ST/15L/R***Technical Specifications**

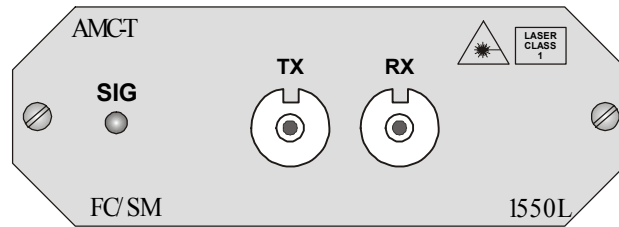
<i>Wavelength</i>	1550 nm
<i>Connector</i>	ST
<i>Transmitter Type</i>	Laser
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-12 dBm
<i>Receiver Sensitivity</i>	-31 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 50 km (31 miles)</li><li>• 25 km (15.5 miles)</li><li>• 20 km (12.4 miles)</li></ul>

**AMC-M/SM/ST/15L/T***Figure A-21. AMC-M/SM/ST/15L/T***Technical Specifications**

<i>Wavelength</i>	1550 nm
<i>Connector</i>	ST
<i>Transmitter Type</i>	Laser
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	Any two level optical protocols up to 155 Mbps
<i>Timing Mode</i>	Transparent
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-12 dBm
<i>Receiver Sensitivity</i>	-31 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 50 km (31 miles)</li><li>• 25 km (15.5 miles)</li><li>• 20 km (12.4 miles)</li></ul>

**AMC-M/SM/FC/15L/R***Figure A-22. AMC-M/SM/FC/15L/R***Technical Specifications**

<i>Wavelength</i>	1550 nm
<i>Connector</i>	FC
<i>Transmitter Type</i>	Laser
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-12 dBm
<i>Receiver Sensitivity</i>	-31 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 50 km (31 miles)</li><li>• 25 km (15.5 miles)</li><li>• 20 km (12.4 miles)</li></ul>

**AMC-M/SM/FC/15L/T***Figure A-23. AMC-M/SM/FC/15L/T***Technical Specifications**

<i>Wavelength</i>	1550 nm
<i>Connector</i>	FC
<i>Transmitter Type</i>	Laser
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	Any two level optical protocols up to 155 Mbps
<i>Timing Mode</i>	Transparent
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-12 dBm
<i>Receiver Sensitivity</i>	-31 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 50 km (31 miles)</li><li>• 25 km (15.5 miles)</li><li>• 20 km (12.4 miles)</li></ul>

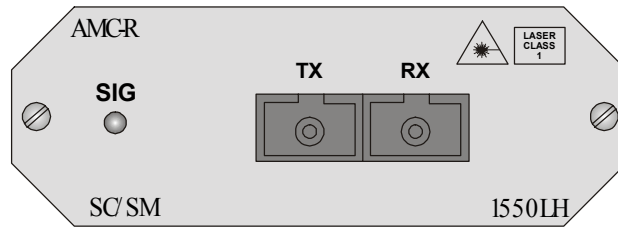
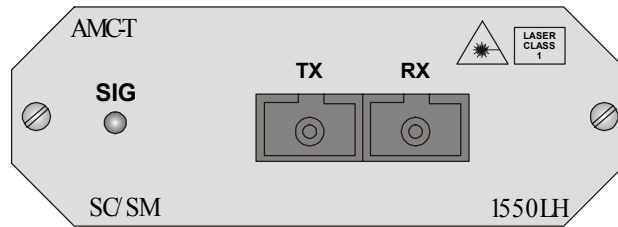
**AMC-M/SM/SC/15LH/R**

Figure A-24. AMC-M/SM/SC/15LH/R

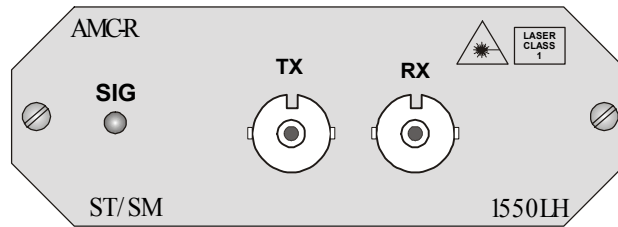
**Technical Specifications**

<i>Wavelength</i>	1550 nm
<i>Connector</i>	SC
<i>Transmitter Type</i>	Laser, long haul
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-2 dBm
<i>Receiver Sensitivity</i>	-34 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"> <li>• 110 km (68 miles)</li> <li>• 100 km (62.1 miles)</li> <li>• 80 km (49.7 miles)</li> </ul>

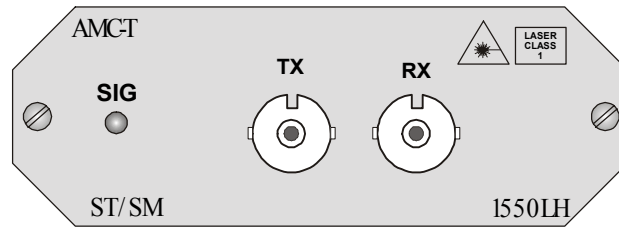


**AMC-M/SM/SC/15LH/T***Figure A-25. AMC-M/SM/SC/15LH/T***Technical Specifications**

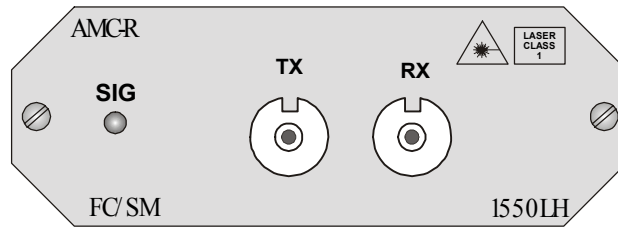
<i>Wavelength</i>	1550 nm
<i>Connector</i>	SC
<i>Transmitter Type</i>	Laser, long haul
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	Any two level optical protocols up to 155 Mbps
<i>Timing Mode</i>	Transparent
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-2 dBm
<i>Receiver Sensitivity</i>	-34 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 110 km (68 miles)</li><li>• 100 km (62.1 miles)</li><li>• 80 km (49.7 miles)</li></ul>

**AMC-M/SM/ST/15LH/R***Figure A-26. AMC-M/SM/ST/15LH/R***Technical Specifications**

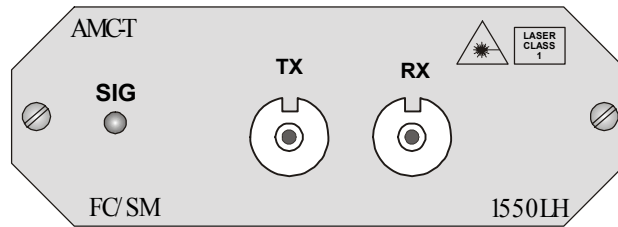
<i>Wavelength</i>	1550 nm
<i>Connector</i>	ST
<i>Transmitter Type</i>	Laser, long haul
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-2 dBm
<i>Receiver Sensitivity</i>	-34 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 110 km (68 miles)</li><li>• 100 km (62.1 miles)</li><li>• 80 km (49.7 miles)</li></ul>

**AMC-M/SM/ST/15LH/T***Figure A-27. AMC-M/SM/ST/15LH/T***Technical Specifications**

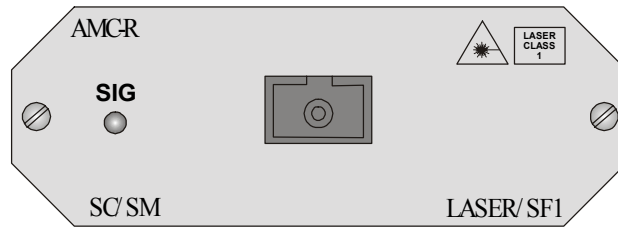
<i>Wavelength</i>	1550 nm
<i>Connector</i>	ST
<i>Transmitter Type</i>	Laser, long haul
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	Any two level optical protocols up to 155 Mbps
<i>Timing Mode</i>	Transparent
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-2 dBm
<i>Receiver Sensitivity</i>	-34 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 110 km (68 miles)</li><li>• 100 km (62.1 miles)</li><li>• 80 km (49.7 miles)</li></ul>

**AMC-M/SM/FC/15LH/R***Figure A-28. AMC-M/SM/FC/15LH/R***Technical Specifications**

<i>Wavelength</i>	1550 nm
<i>Connector</i>	FC
<i>Transmitter Type</i>	Laser, long haul
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-2 dBm
<i>Receiver Sensitivity</i>	-34 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 110 km (68 miles)</li><li>• 100 km (62.1 miles)</li><li>• 80 km (49.7 miles)</li></ul>

**AMC-M/SM/FC/15LH/T***Figure A-29. AMC-M/SM/FC/15LH/T***Technical Specifications**

<i>Wavelength</i>	1550 nm
<i>Connector</i>	FC
<i>Transmitter Type</i>	Laser, long haul
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	Any two level optical protocols up to 155 Mbps
<i>Timing Mode</i>	Transparent
<i>Coding Method</i>	4B/5B, NRZ
<i>Optical Output</i>	-2 dBm
<i>Receiver Sensitivity</i>	-34 dBm
<i>Maximum Input Power</i>	-1 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 110 km (68 miles)</li><li>• 100 km (62.1 miles)</li><li>• 80 km (49.7 miles)</li></ul>

**AMC-M/SF1/SC/R***Figure A-30. AMC-M/SF1/SC/R***Technical Specifications**

<i>Wavelength</i>	Transmit – 1310 nm, receive – 1550 nm
<i>Connector</i>	SC
<i>Transmitter Type</i>	Laser, WDM
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Optical Output</i>	-12 dBm
<i>Receiver Sensitivity</i>	-29 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 35 km (21.7 miles)</li><li>• 25 km (15.5 miles)</li><li>• 20 km (12.4 miles)</li></ul>

AMC-M/SF1/SC/T

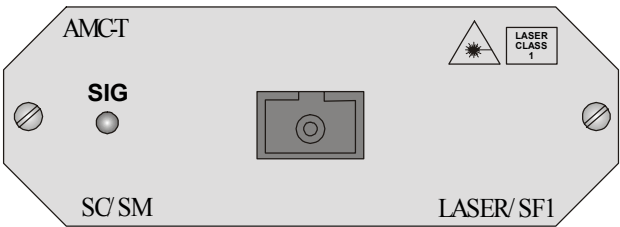
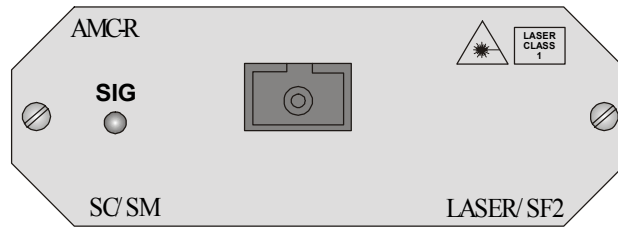


Figure A-31. AMC-M/SF1/SC/T

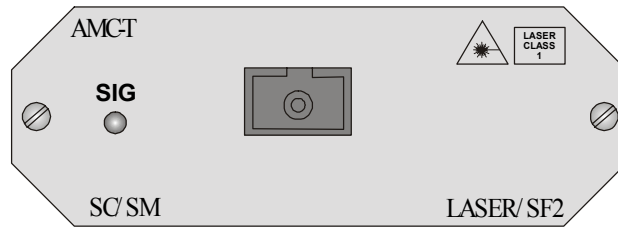
Technical Specifications

Wavelength	Transmit – 1310 nm, receive – 1550 nm
Connector	SC
Transmitter Type	Laser, WDM
Fiber Type	9/125, single mode
Protocols	Any two level optical protocols up to 155 Mbps
Timing Mode	Transparent
Optical Output	-12 dBm
Receiver Sensitivity	-29 dBm
Typical Range	<ul style="list-style-type: none"><li>• 35 km (21.7 miles)</li><li>• 25 km (15.5 miles)</li><li>• 20 km (12.4 miles)</li></ul>

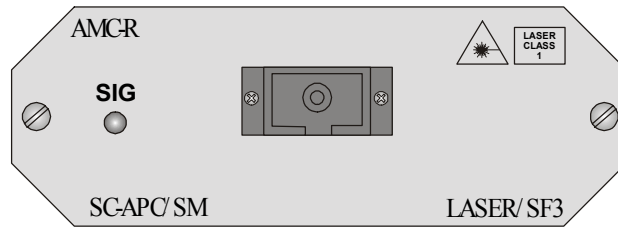
**AMC-M/SF2/SC/R***Figure A-32. AMC-M/SF2/SC/R***Technical Specifications**

<i>Wavelength</i>	Transmit – 1550 nm, receive – 1310 nm
<i>Connector</i>	SC
<i>Transmitter Type</i>	Laser, WDM
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Optical Output</i>	-12 dBm
<i>Receiver Sensitivity</i>	-29 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 35 km (21.7 miles)</li><li>• 25 km (15.5 miles)</li><li>• 20 km (12.4 miles)</li></ul>

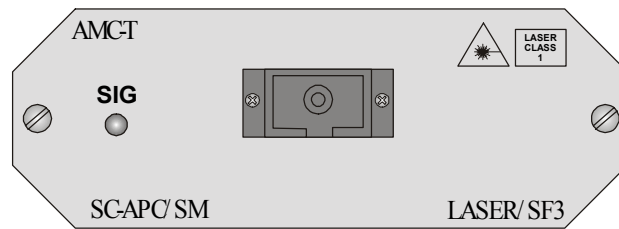


**AMC-M/SF2/SC/T***Figure A-33. AMC-M/SF2/SC/T***Technical Specifications**

<i>Wavelength</i>	Transmit – 1550 nm, receive – 1310 nm
<i>Connector</i>	SC
<i>Transmitter Type</i>	Laser, WDM
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	Any two level optical protocols up to 155 Mbps
<i>Timing Mode</i>	Transparent
<i>Optical Output</i>	-12 dBm
<i>Receiver Sensitivity</i>	-29 dBm
<i>Typical Range</i>	<ul style="list-style-type: none"><li>• 35 km (21.7 miles)</li><li>• 25 km (15.5 miles)</li><li>• 20 km (12.4 miles)</li></ul>

**AMC-M/SF3/R***Figure A-34. AMC-M/SF3/R***Technical Specifications**

<i>Wavelength</i>	1310 nm, transmit and receive
<i>Connector</i>	SC/APC
<i>Transmitter Type</i>	Laser, single fiber
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	TAXI, FDDI, Fast Ethernet, STS-1, STS-3c/STM-1
<i>Timing Mode</i>	Retimed
<i>Optical Output</i>	-12 dBm
<i>Receiver Sensitivity</i>	-27 dBm
<i>Typical Range</i>	20 km (12.4 miles)

**AMC-M/SF3/T***Figure A-35. AMC-M/SF3/T***Technical Specifications**

<i>Wavelength</i>	1310 nm, transmit and receive
<i>Connector</i>	SC/APC
<i>Transmitter Type</i>	Laser, single fiber
<i>Fiber Type</i>	9/125, single mode
<i>Protocols</i>	Any two level optical protocols up to 155 Mbps
<i>Timing Mode</i>	Transparent
<i>Optical Output</i>	-12 dBm
<i>Receiver Sensitivity</i>	-27 dBm
<i>Typical Range</i>	20 km (12.4 miles)

## A.2 Electrical Modules

Electrical modules of AMC-101 operate over UTP, STP and coax cables.

### AMC-M/UTP/155/R

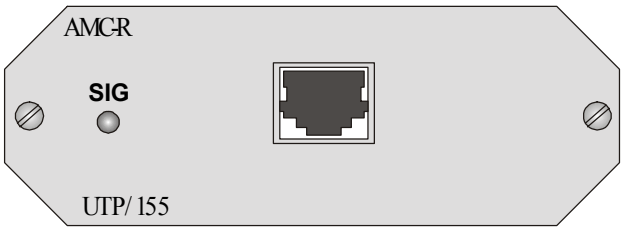


Figure A-36. AMC-M/UTP/155/R

### Technical Specifications

Connector	RJ-45, shielded
Cable Type	UTP Cat 5
Protocols	STS-3c
Timing Mode	Retimed
Coding Method	NRZ
Impedance	100Ω
Typical Range	100m (328 ft)

Table A-1. AMC-M/UTP/155/R Connector Pinout

Pin	Function
1	Tx (+)
2	Tx (-)
3, 4, 5, 6	Not connected
7	Rx (+)
8	Rx (-)

AMC-M/UTP/155/T

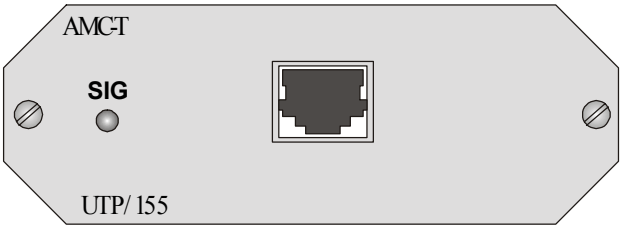


Figure A-37. AMC-M/UTP/155/T

Technical Specifications

Connector	RJ-45, shielded
Cable Type	UTP Cat 5
Protocols	STS-3c
Timing Mode	Transparent
Coding Method	NRZ
Impedance	100Ω
Typical Range	50m (164 ft)

Table A-2. AMC-M/UTP/155/T Connector Pinout

Pin	Function
1	Tx (+)
2	Tx (-)
3, 4, 5, 6	Not connected
7	Rx (+)
8	Rx (-)

AMC-M/STP/155/R

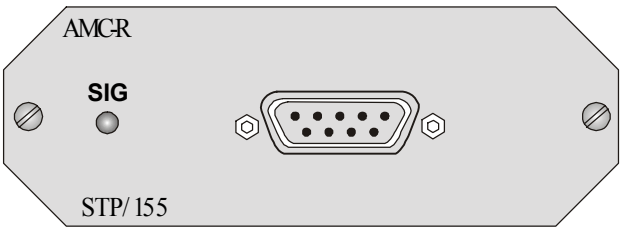


Figure A-38. AMC-M/UTP/155/R

Technical Specifications

Connector	DB-9, female
Cable Type	STP Type 1
Protocols	STS-3c
Timing Mode	Retimed
Coding Method	NRZ
Impedance	150Ω
Typical Range	100m (328 ft)

Table A-3. AMC-M/STP/155/R Connector Pinout

Pin	Function
1	Rx (+)
2, 3, 4, 7, 8	Not connected
5	Tx (+)
6	Rx (-)
9	Tx (-)

AMC-M/STP/155/T

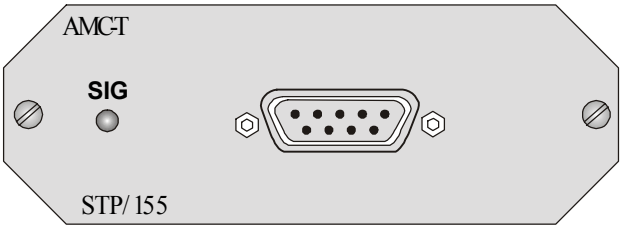


Figure A-39. AMC-M/UTP/155/T

Technical Specifications

Connector	DB-9, female
Cable Type	STP Type 1
Protocols	STS-3c
Timing Mode	Transparent
Coding Method	NRZ
Impedance	150Ω
Typical Range	50m (164 ft)

Table A-4. AMC-M/STP/155/T Connector Pinout

Pin	Function
1	Rx (+)
2, 3, 4, 7, 8	Not connected
5	Tx (+)
6	Rx (-)
9	Tx (-)

AMC-M/UTP/100/R

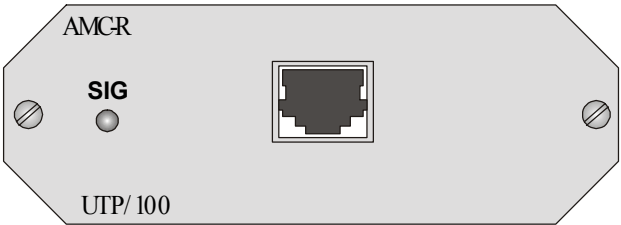


Figure A-40. AMC-M/UTP/100/R

Technical Specifications

Connector	RJ-45, shielded
Cable Type	UTP Cat 5
Protocols	FDDI
Timing Mode	Retimed
Coding Method	NRZ
Impedance	100Ω
Typical Range	100m (328 ft)

Table A-5. AMC-M/UTP/155/R Connector Pinout

Pin	Function
1	Tx (+)
2	Tx (-)
3, 4, 5, 6	Not connected
7	Rx (+)
8	Rx (-)



AMC-M/UTP/100/T

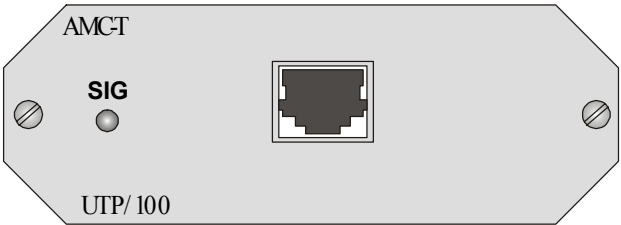


Figure A-41. AMC-M/UTP/100/T

Technical Specifications

Connector	RJ-45, shielded
Cable Type	UTP Cat 5
Protocols	FDDI
Timing Mode	Transparent
Coding Method	NRZ
Impedance	100Ω
Typical Range	50m (164 ft)

Table A-6. AMC-M/UTP/100/T Connector Pinout

Pin	Function
1	Tx (+)
2	Tx (-)
3, 4, 5, 6	Not connected
7	Rx (+)
8	Rx (-)

AMC-M/CX/BNC/155/R

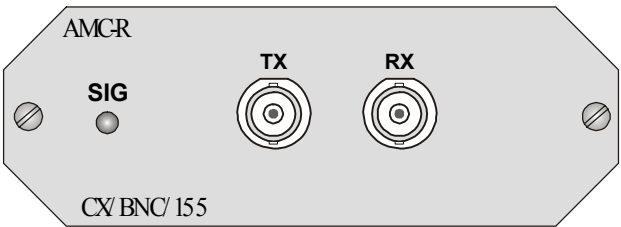


Figure A-42. AMC-M/CX/BNC/155/R

Technical Specifications

Connector	BNC, coax
Cable Type	Coaxial
Protocols	STS-3c, STM-1
Timing Mode	Retimed
Impedance	75Ω
Range Calculation	12.7 dB; 135m range is attainable when using RG-59 B/U (at 78 MHz, in accordance with the square root of frequency law)

AMC-M/CX/DIN/155/R

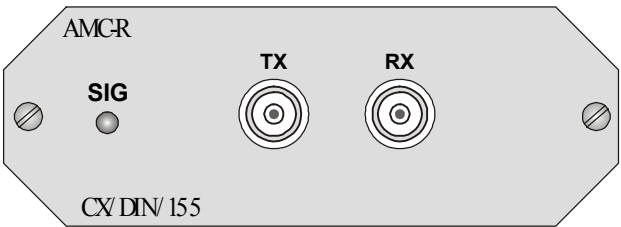


Figure A-43. AMC-M/CX/DIN/155/R

Technical Specifications

Connector	DIN 47295, 1.6/5.6 coax
Cable Type	Coaxial
Protocols	STS-3c, STM-1
Timing Mode	Retimed
Impedance	75Ω
Range Calculation	12.7 dB; 135m range is attainable when using RG-59 B/U (at 78 MHz, in accordance with the square root of frequency law)

AMC-M/10BT/B

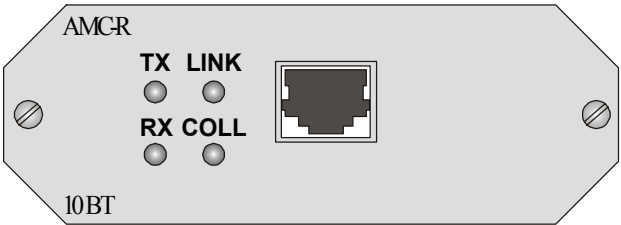


Figure A-44. AMC-M/10BT/B

Technical Specifications

Connector	RJ-45, shielded
Cable Type	UTP Cat 5
Protocols	Ethernet (10BaseT), half or full duplex
Timing Mode	Retimed
Operation Mode	Ethernet bridge
Impedance	100Ω
Typical Range	100m (328 ft)

Table A-7. AMC-M/10BT/B Connector Pinout

Pin	Function
1	Tx (+)
2	Tx (-)
3	Rx (+)
4, 5, 7, 8	Not connected
6	Rx (-)

**Note** The AMC-M/10BT/B modules require the modules of the same type installed at the local and remote sites of the application.

# Customer Response Form

RAD Data Communications would like your help in improving its product documentation. Please complete and return this form by mail or by fax or send us an e-mail with your comments.

Thank you for your assistance!

Manual Name: AMC-101

Publication Number: 333-200-03/06

Please grade the manual according to the following factors:

	<i>Excellent</i>	<i>Good</i>	<i>Fair</i>	<i>Poor</i>	<i>Very Poor</i>
Installation instructions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Operating instructions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Manual organization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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What did you like about the manual?

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## Error Report

- Type of Error(s)  
or Problem(s):
- ☐ Incompatibility with product
  - ☐ Difficulty in understanding text
  - ☐ Regulatory information (Safety, Compliance, Warnings, etc.)
  - ☐ Difficulty in finding needed information
  - ☐ Missing information
  - ☐ Illogical flow of information
  - ☐ Style (spelling, grammar, references, etc.)
  - ☐ Appearance
  - ☐ Other \_\_\_\_\_

Please list the exact page numbers with the error(s), detail the errors you found (information missing, unclear or inadequately explained, etc.) and attach the page to your fax, if necessary.

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Please add any comments or suggestions you may have.

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- You are:
- ☐ Distributor
  - ☐ End user
  - ☐ VAR
  - ☐ Other \_\_\_\_\_

Who is your distributor? \_\_\_\_\_

Your name and company: \_\_\_\_\_

Job title: \_\_\_\_\_

Address: \_\_\_\_\_

Direct telephone number and extension: \_\_\_\_\_

Fax number: \_\_\_\_\_

E-mail: \_\_\_\_\_









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